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REMARKS ON A NEW ALCYONOID POLYP,

FROM BURRARD'S INLET.

BY ROBERT E. C. STEARNS.

[From the Proceedings of the California Academy of Sciences, February 3d, 1873.]

Remarks on a New Alcyonoid Polyp, from Burrard's Inlet.

BY ROBERT E. C. STEARNS.

At a meeting of the Academy held on the 17th July, 1871 (see Proceedings, Vol. IV, page 180,) in referring to a donation to the Museum, made on the previous 5th of June, of what resembled a bundle "of dried willow switches" from Burrard's Inlet, our fellow member, Dr. Blake, regarded them, as I infer from the brief published abstract of his remarks, as pertaining to a new species of sponge. The exceedingly meagre data in our possession at present, preclude any positive conclusion as to the true position of these apparent "rods or switches of bone," for on referring to our records I see that the specimens were sent "with no information accompanying them, except that they were 'skeletons of some kind of fish!'" At the time of the donation, "It was thought by some to be the internal structure of a species of zoöphyte, allied to Virgularia."

With the specimens alone, and without any knowledge of the fleshy or soft parts, and no particulars as to physiognomy or habit of the organization of which each of these switch-like forms is a part, we can only reason from analogy, and not with satisfactory definiteness.

It is quite certain that they are not the back-bones, and quite unlikely that they are fin-bones of any species of fish; as between zoöphytes and sponges, to which latter Dr. Blake regards the specimens as allied, I am decidedly of the opinion, after an examination of the limited authorities at my command, that they belong to a species of zoöphyte, and are included within some one of the groups of the Order of Alcyonoid Polyps.

"The solid secretions of these polyps are of two kinds: Either (1) internal and calcareous; or (2), epidermic, from the base of the polyp. The latter make an axis to the stem or branch, which is either horny * * * * or calcareous. A few species have no solid secretions.

All the species are incapable of locomotion on the base; yet there are some that sometimes occur floating in the open ocean."*

In the third division of the Alcyonoid Polyps, following Prof. Dana's classification, we have the "*Pennatula tribe*, or PENNATULACEA. These are compound alcyonoids, that instead of being attached to rocks, or some firm support, have the base or lower extremity free from polyps and buried in the sand or mud of the sea-bottom, or else live a floating life in the ocean. Their forms are very various."†

After referring to certain species of the *Veretillidæ*, their structure and beauty, other forms are mentioned belonging to the Pennatula tribe, some of

* Dana; Coral and Coral Islands, pp. 80, 81.

† Ibid., page 91.

which, like the group Pennatulidæ, have a stout axis, with branches either side, arranged regularly in plume-like style, or a "very slender stem and very short lateral polyp-bearing pinnules or processes along it (the Virgularidæ); * * * and some of these have a slender stem, and the polyps arranged along one side of it (the Pavonariadæ); and still others a terminal cluster of polyps (the Umbellularidæ).

The most of these species secrete a slender horny axis, and have slender calcareous spicules among the tissues, somewhat like those of Gorgonidæ."*

This internal *horny* axis is also described as "bony"† by other writers; it is covered with a fleshy substance, of a consistence like that of the Actinia, which, being largely composed of water, leaves but little solid matter when dried, which is brushed off or crumbles away with very little handling.

In the Pennatulæ, or Sea-pens, the central stalk or axis is of moderate length and the pinnæ rather long, presenting the appearance of a feather; or as Lamarck said, "it seems, in fact, as if nature, in forming this compound animal, had endeavored to copy the external form of a bird's feather."

"In some genera, *Virgularia* and *Pavonaria*, to which the name of "sea-rushes" has been given, the central stem is very much prolonged, some of them measuring between three and four feet in length. The polypiferous lobes are comparatively short." §

To either the sea-pens (Pennatulidæ), or the Umbellate corals (Umbellularidæ), I believe these specimens belong; and of the two groups indicated, I am inclined to place them in the latter; said group is characterized by a "Polypary free, simple elongated, with the polyps at the summit; axis stony, inarticulate, covered with a fleshy cortex; polyps large, terminal, arranged in an umbellate manner at the end of the polypary."‡

Figuier remarks that "Les Ombellulaires ont une tres-longue tige, soutenue par un os de même longueur et terminée au sommet seulement par un bouquet de polypes."‖

"The physiological phenomena which the Pennatula present is extremely interesting, since it exhibits the example of a truly composite animal, that is, one in which animals, more or less in number, really perfect so far as comports with the grade of organization to which they belong, form part of a common living * * * body, serving as an intermedium for nutrition to all the individuals, so that they are all nourished together in a mediate manner by means of this common portion of which they form a part.

The nutriment which favorable circumstances have placed within the reach of one individual, nourishes that individual first, and then, by extension, nourishes the common stem; and thus the other polypi, which constitute organic portions of it, receive their share."¶

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* Ibid, page 91.

† Dallas, in "Orr's Circle of the Sciences."

§ Dallas, Ibid.

‡ Manual Nat. Hist. Travellers, page 357.

‖ La Vie et les Mœurs des Animanx, Paris, 1866.

¶ Cuvier; Mollusca and Radiata, by Griffith and Pidgeon. London, 1834.

Or in other words, the nutrition which is secured or received by an individual polyp, is diffused through and nourishes the whole.

After a consideration of the subject, with the specimens before us, I think the analogies strongly favor a reference to one or the other of the groups I have indicated, instead of the fishes or sponges, to either of which I cannot perceive they hold the slightest relationship.

From the coast of Greenland, Lamarck has described a species of Umbellularia (U. Grœnlandica,) and we might perhaps, with some degree of reason, look for a related form upon the Pacific side, in some northern station where the physical conditions measurably correspond to those of the habitat of the north Atlantic species cited.

It will be readily perceived, that before an accurate determination can be arrived at, the living forms, of which I believe these "switches" are the central stalks or axes, must be studied *in situ*, as it is quite doubtful whether the fleshy portion can be preserved.

At a meeting of the Academy subsequent to the date of Dr. Blake's remarks to which I have alluded, reference was made to a communication by Mr. Sclater, in the scientific weekly publication, "Nature," bearing upon this subject.

After writing down the conclusions which I have just read, through the courtesy of Dr. Hewston, I was enabled to examine a file of that publication, and I find that Mr. Sclater read a paper before the British Association, at the Brighton meeting, August 20th, 1872,* in which he acknowledges the receipt of several specimens of these "switches," from Captain Herd, of the Hudson's Bay Company, with a statement from the Captain that, "These rods are the backbones of a sort of fish found in great abundance at Burraud's Inlet, Washington Territory, North-west America, whence they have been brought by two Captains in our service. These animals are shaped like a Conger eel, but are quite transparent, their bodies being composed of a mass of jelly — they are about 8 inches in diameter. The head is like a shark's head: it is attached to the thick end of the rod — it has two eyes and a mouth placed low down. The backbone is also transparent in the living animal, but becomes hard when dried on the beach by the sun. These fishes swim about in shoals, along with the dog-fishes." Other information was received by Mr. Sclater, of the same tenor.

A specimen of the switches was sent by Mr. Sclater to Prof. Kolliker, of Wurzburg, who had shortly before been engaged in monographing the Pennatulidæ; and the latter gentleman, in reply, stated his belief, "That the object you sent me * * * is indeed the axis of an unknown Pennatulidæ, etc."

"Prof. Flower, Prof. Milne-Edwards of Paris, and several other Naturalists, who visited the rooms of the Zoölogical Society * * all said that the objects were new to them, and that they did not know what they were, but were mostly inclined to regard them as the axis of an unknown Pennatulide animal."†

From the allusion (in the foot-note) in "Nature" to Dr. Gray, and his refer-

* See "Nature," Vol. VI, page 436.

† See "Nature"; also foot-note.

ence of one of these switches to a genus (Osteocella) made by him, I quote as follows from page 405, of the Annals and Magazine of Natural History, Vol. IX, (Fourth Series). Dr. Gray refers to the Genus Osteocella as follows: "Mr. Clifton, many years ago, sent * * * to the British Museum, the 'backbone taken out of the marine animal in bottle marked No. 1. I caught him, or it, swimming with great rapidity in shallow water.' The bottle never reached the British Museum; but the backbone did; and I described it at the end of the 'Catalogue of Sea-Pens, or Pennatulidæ, in the British Museum,' published in 1870, under the name of 'Osteocella Cliftoni'; but considered it very doubtful its belonging to the Pennatulidæ."

The British Museum has lately received a very long, slender bone, 64½ inches long and 3-16 inch broad in its broadest part, which was sent to the Zoölogical Society by the Hudson Bay Company, and evidently came from the northern seas, probably from the west coast of America.

Mr. Carter has kindly examined the Australian specimen sent by Mr. Clifton, and the one sent * * by the Hudson Bay Company * * * and finds them, under the microscope, "present the same horny structure, viz., a fibrous trama, more or less charged with oval cells or spaces, quite unlike that of *Gorgonia* and *Pennatula*, which present a concentric mass of horny layers, charged more or less with calcareous crystalline concretions. It is evidently a second species of the same genus, *Osteocella*."

After a few lines, follows a description of the genus

"*Osteocella*, Gray, Cat. of Pennatulidæ (1870), p. 40."

After describing the style, or axis, he refers to the animal (which neither he nor we have seen) in the following words: "Animal or colony of animals free, marine; otherwise unknown; most probably like the Pennatulidæ, but the style is harder, more calcareous and polished than any known style belonging to that group, which are generally square, sometimes cylindrical, but rarely fusiform in the genus *Virgularia*; or, it may be the long conical bone of a form of decapod cephalopod, which has not yet occurred to naturalists, as Mr. Clifton spoke of its being a free marine animal, and it has a cartilaginous apex like the cuttlefish. * * * * It is evident that there are two species of animal yielding this kind of bony substance:

1. *Osteocella Cliftoni*. Thick, about 11 inches long, tapering at each end. From Western Australia.

2. *Osteocella septentrionalis*. Long, slender, about 64 inches long, attenuated at the base, and very much attenuated and elongated at the other end. Northern Seas? Collected by the Hudson's Bay Company."

This latter, undoubtedly refers to the same forms, of which we have numerous specimens in the Academy's Museum, and which are referred to in this paper.

Dr. Gray proceeds and says: "Mr. Carter informs me that subsequent examination of this axis with acid, 'shows that it is similarly composed to that of *Gorgonia*, viz., of keratacous fibre or substance, and calcareous crystalline matter like that of the stem of *Osteocella Cliftoni*, and the other Pennatulidæ,

which it most nearly resembles'; so that my original view as to the nature of this organ seems to be thus confirmed."

From what is herein quoted from Dr. Gray's paper, it will be perceived, that while the microscopic examination showed it to be "quite unlike that of *Gorgonia* and *Pennatula*," that Mr. Carter's subsequent examination of the second species referred to *Osteocella*, "shows that it is similarly composed to that of *Gorgonia*, * * * and * * * like that of the stem of *Osteocella Cliftoni*, and the other Pennatulidæ," etc.

Dr. Gray's paper implies a collision between the *microscopic test* and the *examination with acid;* and the description of his genus contains a doubt as to which division of the animal kingdom *Osteocella* is related. With high regard for the justly distinguished naturalist, it must be admitted that his genus is quite indefinite, and could be construed to cover a wide range; but as he has attached it to the catalogue of Pennatulidæ, it is perhaps fair to infer that in his mind the balance of reasoning tends in that direction; as between the microscopic and the acid tests, the latter is of insignificant value.

But returning to the "switches," I find that Mr. Sclater does not commit himself, but with apparent consideration for the intelligence of the parties who sent him the specimens and their statement that they belonged to a species of fish, he only says that, "supposing * * * * that these objects are really derived from such an animal as is described and figured above, I can only suggest that they may be the hardened notochords of a low-organized fish, allied either to the Chimæroids or to the Lampreys, in which the notochord is persistent throughout life. It is quite certain, I think, that they cannot be any part of the true vertebral column."

On page 432 of the same number of "Nature," appears an article relating to Mr. Sclater's paper, from Mr. H. N. Moseley, who, after what appears to have been a rather careful examination of the authorities upon the groups to which he thinks it belongs, as well as upon its microscopical structure, expresses an endorsement of Prof. Kolliker's opinion, and closes by saying: "In the mean time I cannot but conclude that Mr. Sclater has been misinformed, and that we are very unlikely ever to see that marvellous fish in the flesh."

Again: in "Nature," of October 24th, 1872,* Mr. J. W. Dawson, Principal of the McGill College, at Montreal, writes that, presuming that the "disputed organism * * is specifically identical with a specimen from Frazer River * * presented * * for the Museum of the University * * *. I at once recognised it as the axis of a Virgularia, or some similar creature * * * *. I submitted it to Prof. Verrill, of Yale College, who had no doubt as to its nature;" and Mr. Whiteaves, of Montreal, noticed it in his report, "as an undescribed Pennatulid."

Then follows Dr. Blake, in "Nature," (of November 28th, 1872)† to which previous reference has been made by me, as it is a part of this Academy's proceedings, in which, as the result of a microscopic investigation, he says: "An

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* Vol. VI, No. 156.

† Vol. VII, page 161.

examination of the specimens * * enables me to refer them to the Protozoa class, Spongidæ, or sponges"; and he concludes by saying: "Its generic relations will, I think, be with Hyalonema and Euplectella, both sponges of the Pacific."

The foregoing is all that I find relating to the "switches," prior to my remarks as above; I was not aware, at the time, that anything had appeared on the subject, other than the remarks of Dr. Blake, and that of Mr. Sclater's article, to which Dr. Blake referred. Mr. Sclater's article I had not read, but had casually glanced at the drawing of the so-called fish.

But having expended so much time prior to an examination of the files of "Nature," I considered it a matter of sufficient interest to warrant a review of the subject, and present the same to the Academy.

As to what these animal "switches" belong, it will be seen that Dr. Blake, whose examination of their substance microscopically appears to have been quite thorough, places them with the *sponges*. Mr. Sclater does not commit himself, but *conditionally* refers them to the *fishes*. Dr. Gray described (it) them as a new species of *Osteocella*, whatever that may be, (perhaps a *Pennatulid*) while Professors Kolliker, Flower, Milne-Edwards, Mr. Mosely, Principal Dawson, Prof. Verrill, Mr. Whiteaves, Mr. Dall and myself, regard them as belonging to a species of Alcyonoid polyp, related or pertaining to the group *Pennatulidæ*.

On reviewing the above, it will be noticed that the various parties who presented the specimens, both of the Burrard's Inlet forms and that from West Australia, state that they are bones of, or belong to fishes, implying that they are a part of free-swimming animals; while some species of the *Pennatulacea* "live a floating life in the ocean," it is not unlikely that others may not be constantly stationary, or, if I may use the word, are not *planted*, *all* of the time; and while floating might be mistaken for fishes, more especially if numerous specimens were seen moving in the water, coincident with the presence of a school of fishes.

In conclusion, I would state my belief that the much-discussed switches are a species of *Umbellularia*, for which Dr. Gray's specific name might be adopted, and attached to the specimens from Burrard's Inlet, in the Academy's collection.

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